CTCSS Tone Filter
Model 1118

User Manual

For use with SecureSync
GPS Master Oscillators

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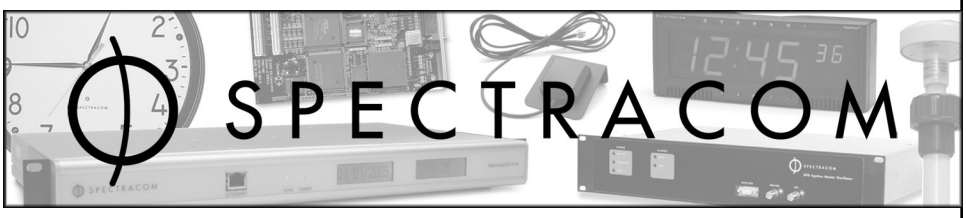

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This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.

– Increase the separation between the equipment and receiver.

– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

– Consult the dealer or an experienced radio/TV technician for help.

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1 Overview

The Model 1118 CTCSS Tone Generator is used in conjunction with the Spectracom SecureSync Model 1200 to generate precision synchronized CTCSS tones. The master oscillator must be equipped with option module 1204-14 for synchronized CTCSS outputs which are typically required for the conventional analog land mobile radio base stations to successfully simulcast.

There are 2 versions of the 1118; the 1118-2 a version with an enclosure, and the 1118-1, a rail mount version. This manual lists the pins and connectors for the 1118-2 first, then the pins and connections for the 1118-1 in brackets [ ].

Refer to Rev D of the manual if you will be connecting an existing 8195A, 8195B, 8197, or 8197B GPS Master Oscillator to the 1118.

1.1 System Overview

Using a master oscillator with Option 1204-14 installed to provide a synchronized CTCSS tone to land mobile radio base station.

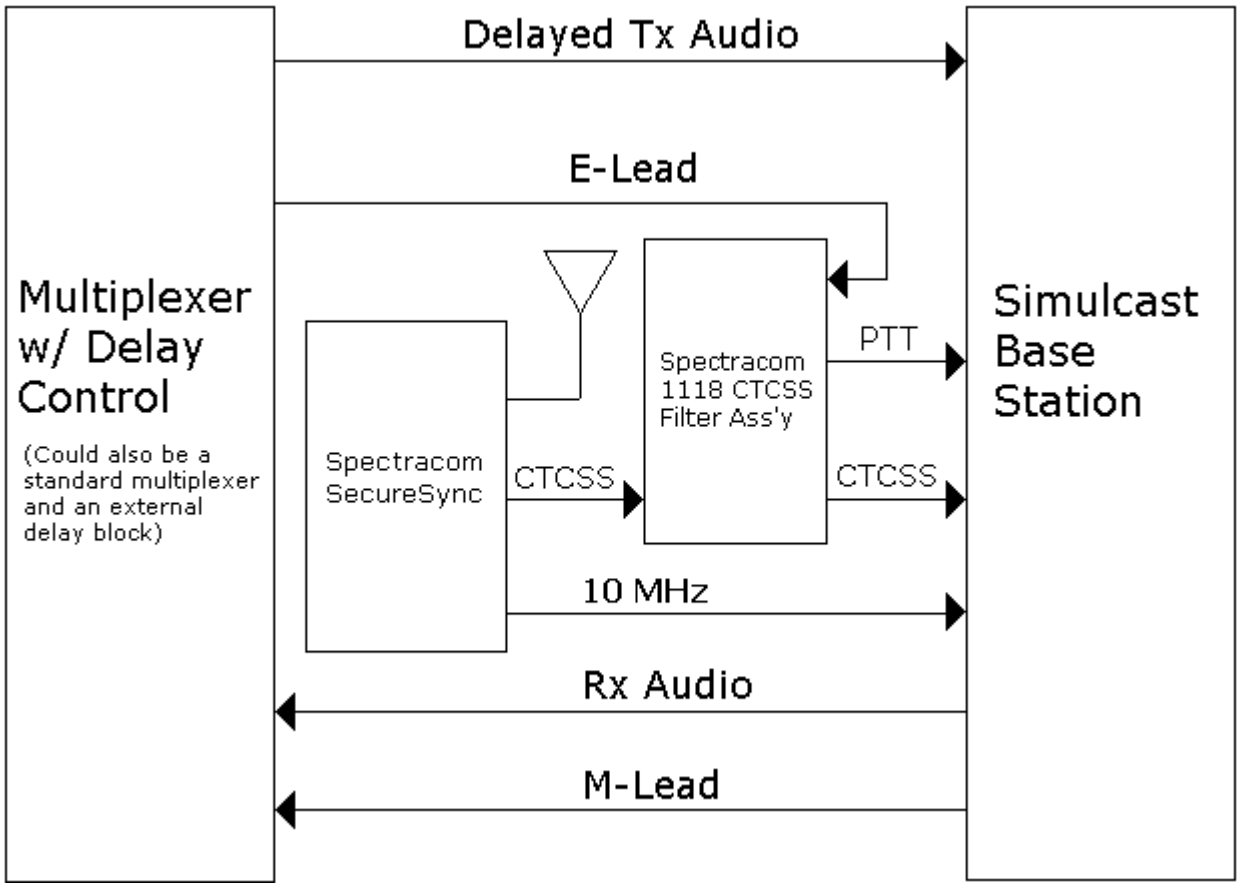

Figure 1-1: Block Diagram of Typical TX Site Interconnection

The SecureSync GPS master Oscillator generates **user configurable tone(s)** and an 18 kHz reference signal. The Model 1118 CTCSS boards receive the configured CTCSS tone(s) and the 18 kHz reference from the master oscillator, as well as a PTT from the multiplexer. It presents the selected CTCSS tone as a sine wave, and an active PTT signal to the simulcast radio(s) following the PTT source at the head end. The tone can be configured for squelch tail elimination.

Inputs to the Model 1118

INPUT	RECEIVED FROM	FUNCTION
CTC1 and CTC2	Master Oscillator	1st and 2nd tones (1204-14)
18 kHz	Master Oscillator	Clock Reference frequency
PTT (Push to Talk)	Multiplexer	Used to activate the delayed PTT output (gates the CTCSS tone and provides squelch tail elimination).
Inhibit input (if used)	Multiplexer	De-activates the CTCSS output tone
Power (7 to 20vdc)	Transmitter	Powers the CTCSS board

Outputs from the Model 1118

INPUT	SENT TO	FUNCTION
CTCSS out	Transmitter	Selected CTCSS tone (Can be CTC1 or CTC2)
Held PTT output (Push to talk)	Transmitter	Keys the transmitter.

1.2 Features

The Spectracom CTCSS Tone Generator offers the following features:

- Tone locked to GPS on-time-point, so they launch in phase from all sites
- Accuracy: Continuous self-calibrated to GPS provides $\pm 1.0 \times 10^{-11}$ frequency accuracy.
- PTT input and an adjustable delayed PTT output.
- TIA compliant CTCSS reverse burst.
- Inhibit input that disables CTCSS tone generation.

1.3 Inventory

Before installing your Spectracom equipment, please verify that all material ordered has been received. If there is a discrepancy, please contact Spectracom Customer Service at +1 585.321.5800.

1.3.1 Ancillary Kit

Your Spectracom CTCSS 1118 unit is provided with an ancillary kit containing the following accessories:

- Male DB9 Connector
- Female DB9 Connector
- DB9 Shields (2)
- Male DB15 Connector
- Female DB15 Connector
- DB15 Shields (2)
- 3-Pin Plug
- 6-Pin Plug

1.4 Inspection and Support

Unpack the equipment and inspect it for damage. If any equipment has been damaged in transit, please contact Spectracom Customer Service at US 585.321.5800.

If any problems occur during installation and configuration of your Spectracom product, please contact Spectracom Technical Support at US 585.321.5823 or US 585.321.5824.

	CAUTION
	Electronic equipment is sensitive to Electrostatic Discharge (ESD). Observe all ESD precautions and safeguards when handling Spectracom equipment.

NOTE: If equipment is returned to Spectracom, it must be shipped in its original packing material. Save all packaging material for this purpose.

2 Specifications

Refer to Figure 2-1 for connector and jumper locations.

2.1 Outputs

2.1.1 Standard CTCSS Frequency Output (Continuous Tone Controlled Squelch System)

Signal: 67-254 Hz sine wave derived from GPS disciplined oscillator with configurable 180-degree inverted "reverse burst" tone when PTT unkeyed. Refer to Table 2-1 for tone frequencies and H1 jumper position. The desired CTCSS frequency tones are generated in the master oscillator. The tones selected can be "exactly" on frequency (or rounded to the nearest 0.333 Hz to support compatibility with sites using legacy Spectracom Model 8195 or 8197 GPS Master Oscillators).

Connector: 12 pin pluggable header J4 pins 6 and 7 [or 6 Pin Header J6 pin 1, and 3 Pin Header J5 pin 1].

Signal Level: Adjustable with a potentiometer from 0.0 to 4.0 volts P-P (1.4 Vrms) into 600 ohms.

Source Impedance: 33 ohms

Harmonics: 25dB below the CTCSS fundamental minimum

Spurious: 25dB below the CTCSS fundamental minimum

PTT Operation: CTCSS tones are gated by PTT with a configurable PTT hold or millisecond reverse burst.

Code	Tone Freq.	Tone Freq. to nearest 1/3 Hz	H1 Pos	Code	Tone Freq.	Tone Freq. to nearest 1/3 Hz	H1 Pos	Code	Tone Freq.	Tone Freq. to nearest 1/3 Hz	H1 Pos
XZ	67.0	67.000	B	1B	107.2	107.333	B	6A	173.8	173.666	A
WZ	69.3	69.333	B	2Z	110.9	111.000	B	6B	179.9	180.000	A
XA	71.9	72.000	B	2A	114.8	114.666	B	7Z	186.2	186.333	A
WA	74.4	74.333	B	2B	118.8	119.000	B	7A	192.8	192.666	A
XB	77.0	77.000	B	3Z	123.0	123.000	B	M1	203.5	203.666	A
WB	79.7	79.666	B	3A	127.3	127.333	B	8Z	206.5	206.666	A
YZ	82.5	82.666	B	3B	131.8	131.666	B	M2	210.7	210.666	A
YA	85.4	85.333	B	4Z	136.5	136.666	B	M3	218.1	218.000	A
YB	88.5	88.666	B	4A	141.3	141.333	B	M4	225.7	225.666	A
ZZ	91.5	91.666	B	4B	146.2	146.333	B	9Z	229.1	229.000	A
ZA	94.8	94.666	B	5Z	151.4	151.333	A	M5	233.6	233.666	A
ZB	97.4	97.333	B	5A	156.7	156.666	A	M6	241.8	241.666	A
1Z	100.0	100.000	B	5B	162.2	162.333	A	M7	250.3	250.333	A
1A	103.5	103.666	B	6Z	167.9	168.000	A	0Z	254.1	254.000	A

TABLE 2-1: CTCSS Standard Frequency Chart

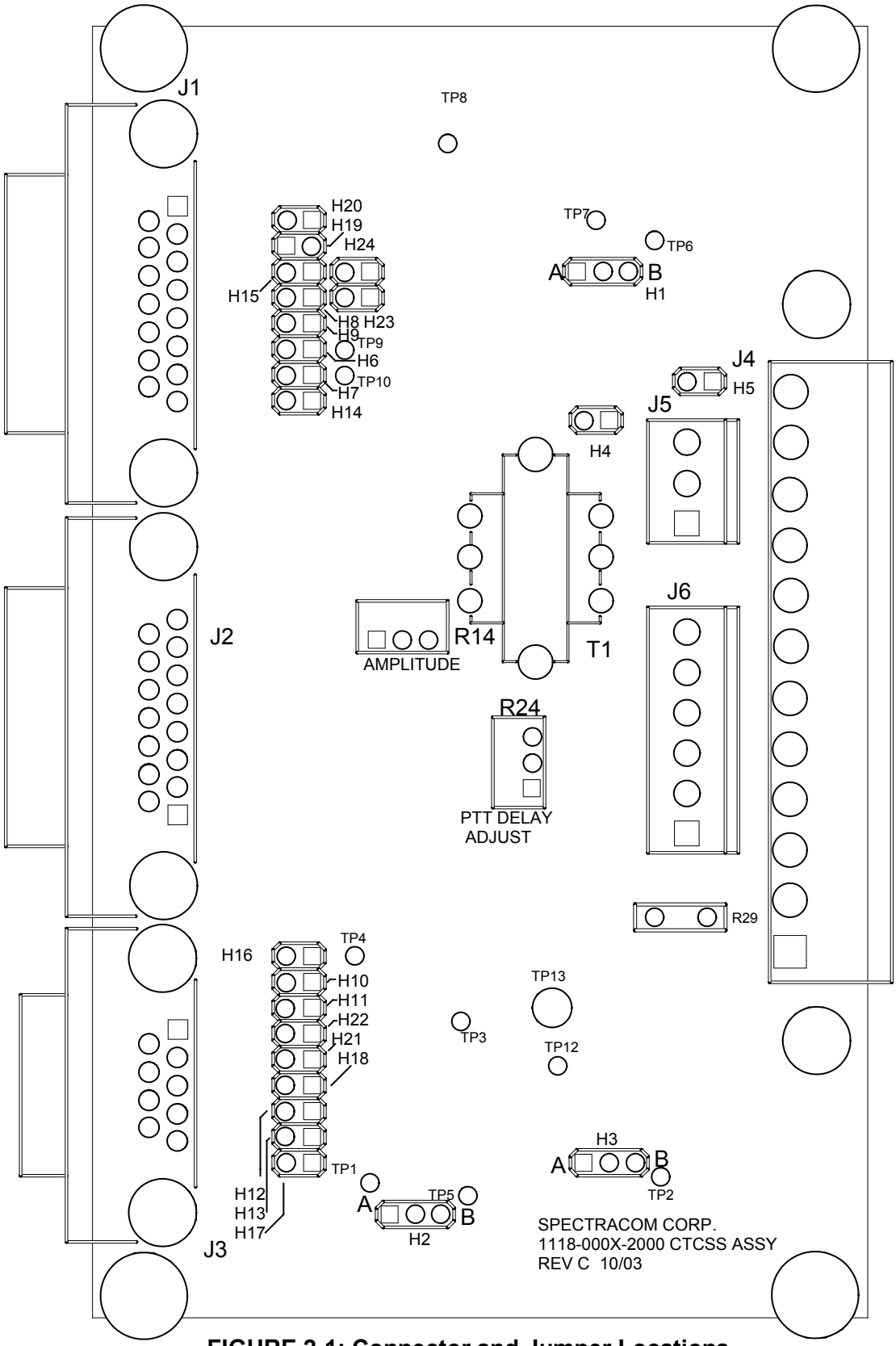

FIGURE 2-1: Connector and Jumper Locations

2.1.2 PTT Output

Signal:	Digital
Connector:	12 Pin Pluggable Header J4, Pin 9 [or 6 Pin Header J6, Pin 6]
Signal Level:	Output structure is a Solid State Switch consisting of two MOSFETS (AC and DC operation) that present a high resistance when off and less than 0.4 ohms when on.
Pulse Width:	Follows PTT Input plus an adjustable delay (100 – 500 milliseconds), factory set to 150 milliseconds.
Delay Control:	The trailing edge of the PTT output is delayed 100 – 500 milliseconds from the trailing edge of the PTT input, factory set to 150 milliseconds.
Delayed PTT Operation:	CTCSS tones are gated by PTT; the PTT input active immediately causes the PTT Output to go active. PTT inactive will cause the PTT output to go inactive after the PTT hold time. The delay is factory set to 150 milliseconds.

2.2 Inputs

2.2.1 PTT Input

Signal:	Digital CMOS levels
Connector:	12 Pin Pluggable Header J4 Pin 5 [or 6 Pin Header J2 Pin 5].
Signal Level:	CMOS 0.5-4.5 volts or contact closure to ground, minimum sink current = 0.01 amps. Turn on current equals 10 ma and turn off current equals 1ua. Turn on voltage equals 0.8 volts and turn off voltage equals 4.5 volts
Impedance:	2700 ohms
Polarity:	H3 position A for PTT on with closed circuit H3 position B for PTT on with open circuit

2.2.2 Synchronized CTCSS Digital Inputs

There are 2 possible CTCSS inputs, labeled CTCSS #1 and CTCSS #2 on the DB-15 input. The different CTCSS frequencies are set on the SecureSync that is driving the CTCSS filter board assembly. The input to the CTCSS filter assembly is on connector J1 (CTCSS #1 and 2).

J2 on the 1118 is a loop thru connector for connecting more CTCSS filter boards set on the CTCSS #1 and CTCSS #2 to the same SecureSync output. If the loop thru connector is used,

the termination of the CTCSS and 18 kHz signals should be set on the last CTCSS filter board in the string.

The CTCSS inputs are individually selected and terminated with jumpers. Use either jumper pair H6 and H7 for CTCSS #1, or H8 and H9 for CTCSS #2 to select one of the CTCSS inputs.

Signal: RS-485

Connector: DB15 male connector J1, pins 7 and 8 for CTCSS #1, pins 5 and 6 for CTCSS #2

Impedance: 120 ohms or high impedance. A jumper can individually terminate each CTCSS input: jumper H14 for CTCSS #1, jumper H15 for CTCSS #2

2.2.3 18 kHz Clock Input (DB15)

Signal: RS-485

Connector: DB15 male connector J1 Pins 3 and 4

Impedance: 120 ohms or high impedance selected by jumper H19.

2.2.4 Input Power

DC Input: 7 to 20 VDC, 1 W

Connector: 12 Pin Pluggable Header J4 pins 3 and 2 [or 6 Pin Header J6 pins 3 and 4]

Polarity: Positive on J4 pin 3 [or J6 pin 4]

2.3 Connector

2.3.1 Data Sync Port J1 and J2 (DB-15M and F) on 1118

Connector: DB15

Pinout: Refer to Table 1-2

1118 PIN	SIGNAL	DESCRIPTION	OSC 1204-14 DB-9 OUTPUT
1	Reserved	Reserved	
2	Reserved	Reserved	
3	+18 kHz	RS-485 B Terminal	2
4	-18 kHz	RS-485 A Terminal	7
5	+CTCSS Signal #2	RS-485 B Terminal	3
6	- CTCSS Signal #2	RS-485 A Terminal	8
7	+CTCSS Signal #1	RS-485 B Terminal	1
8	- CTCSS Signal #1	RS-485 A Terminal	6
9	Ground	Cable Shield	9
10	Reserved	Reserved	
11	Reserved	Reserved	
12	Reserved	Reserved	
13	Ground	Ground	
14	Ground	Ground	
15	Ground	Ground	

TABLE 1-2: DB-15 Input Pin Assignments

2.3.2 Note Regarding J3

Data Sync J3 DB-9 on 1118 is used only with 8195 GPS Master Oscillators, not with SecureSync.

2.3.3 I/O Connector J4

Connector: 12 pin connectable terminal block
Pinout: Refer to Table 1-6

PIN	SIGNAL	DESCRIPTION
1	Ground	Ground
2	Ground	Ground
3	+ 7 to 20 Volts	Positive power supply voltage
4	Unused	Unused
5	PTT IN	PTT input
6	CTCSS Out +	CTCSS output high
7	CTCSS Out -	CTCSS output low
8	Unused	Unused
9	Delayed PTT Out	Delayed PTT output positive
10	Delayed PTT Out	Delayed PTT output low side
11	Inhibit in	Inhibit input
12	Unused	Unused

TABLE 1-6: I/O Connector Pin Assignments

2.3.4 Transceiver Interface Port A J6

Connector: 6 Pin Header (0.156 spacing)
Pinout: Refer to Table 1-4

PIN	SIGNAL	DESCRIPTION
1	CTCSS Output	CTCSS Output high
2	GND	GND
3	GND	GND
4	+7 to 20 volts	Positive Power Supply Voltage
5	PTT In	PTT Input
6	Delayed PTT Out +	Delayed PTT Output positive

TABLE 1-4: Transceiver Interface Port A Pin Assignments

2.3.5 Transceiver Interface Port B J5

Connector: 3 Pin Header (0.156 spacing)
Pinout: Refer to Table 1-5

PIN	SIGNAL	DESCRIPTION
1	CTCSS Output -	CTCSS Output Low
2	Delayed PTT Out Low	Delayed PTT Output Low
3	INHIBIT IN	INHIBIT Input

TABLE 1-5: Transceiver Interface Port B Pin Assignments

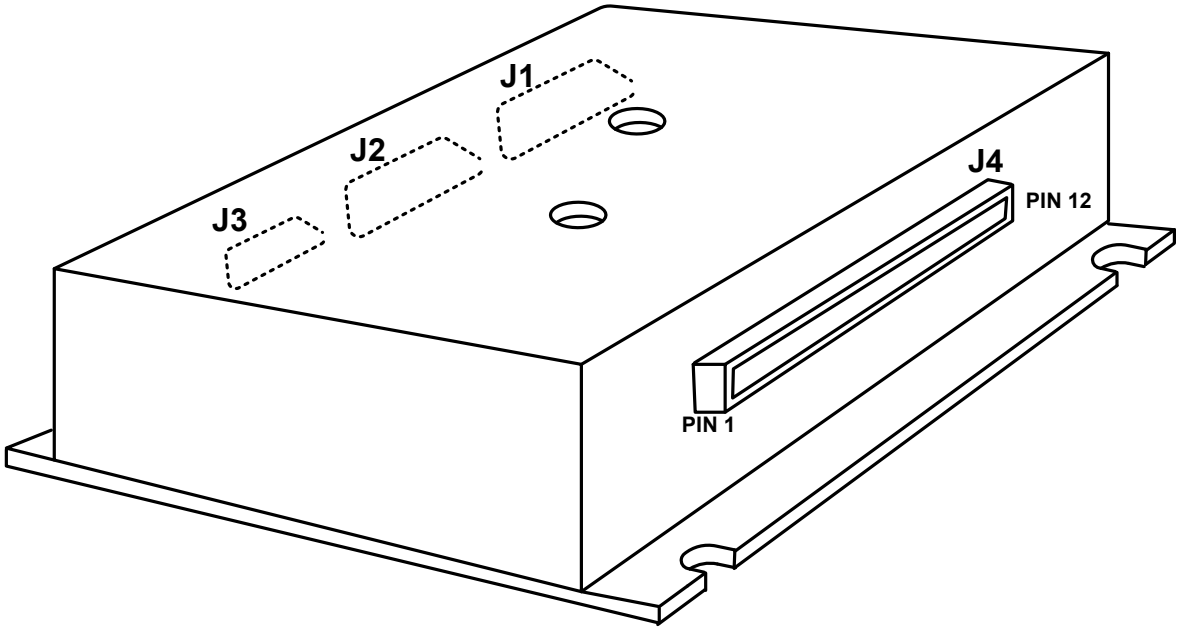

FIGURE 2-1: J4 Pin Numbering, 1118-2

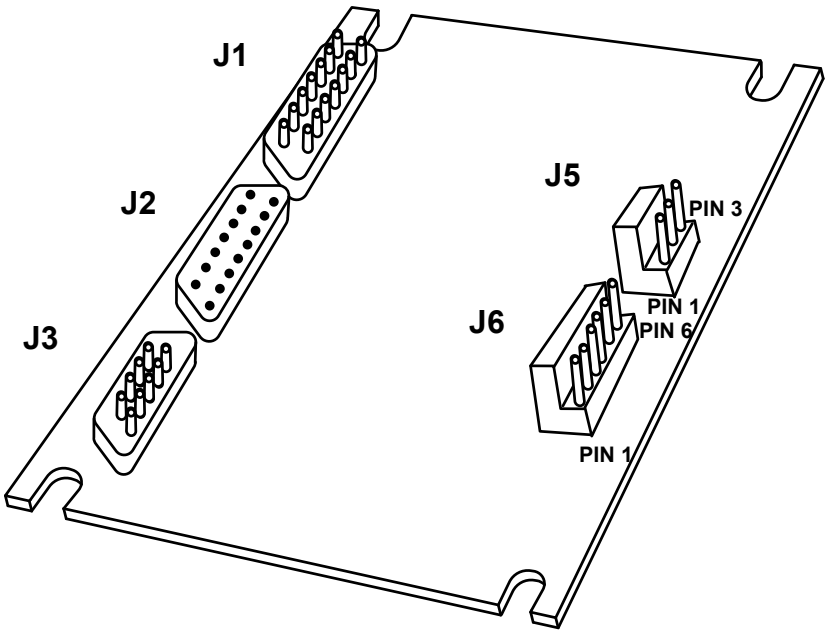

FIGURE 2-2: J5, J6 Pin Numbering, 1118-1

2.4 Mechanical (1118-1)

Dimensions:	5.0” x 3.0” x 0.85” (127mm x 76.2mm x 20mm)
Weight:	1 lb. (2.2 kg) maximum
Shipping Weight:	2 lbs. (4.4 kg) maximum

2.5 Mechanical (1118-2)

Dimensions:	5.25” x 4.25” x 1.25” (134mm x 108mm x 32mm)
Weight:	2 lb. (4.4 kg) maximum
Shipping Weight:	3 lbs. (6.6 kg) maximum

2.6 Environmental

Operating Temperature:	-30 to +60°C
Storage Temperature:	-40 to +85°C
Humidity:	95% R. H. non-condensing

3 Installation

3.1 Quick Installation Instructions – One Tone

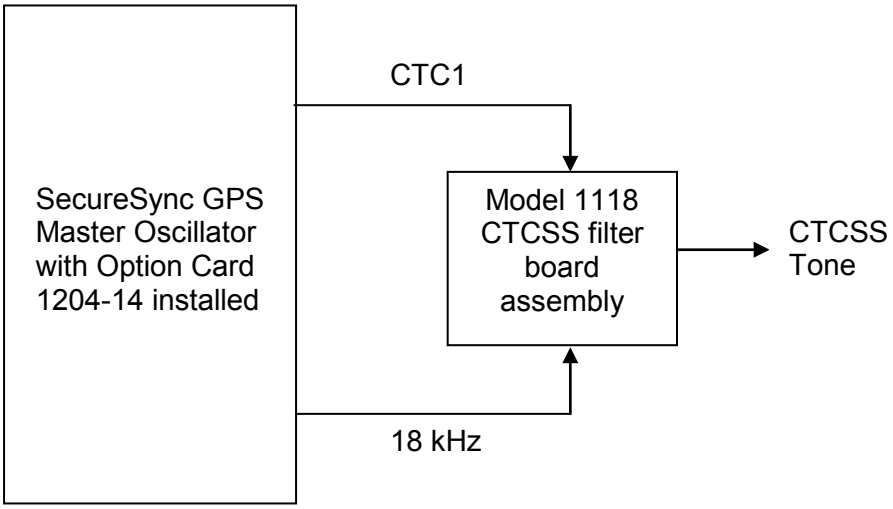

Figure 3-1: Signal Flow to Feed a Synchronized CTCSS Tone to one Transmitter

For CTCSS Outputs #1 and 2:
Unit is setup for a DB9M-DB15F cable from the Spectracom SecureSync provisioned with option module 1204-14.

Connect the cable from the 9-pin (Data Sync) connector on the back of the reference clock and the other end to the DB15M J1 (Data Sync) connector

- Connect J4 (Power & I/O connector) pins 6 (and 7) to the CTCSS input of your base station.
- Connect J4 (Power & I/O connector) pin 5 to the PTT source (multiplexer).
- Connect J4 (Power & I/O connector) pin 9 to the PTT input of your base station.
- Connect J4 (Power & I/O connector) pin 3 to a power source between 7 to 20 VDC.

3.1.1 To Install More Than One Model 1118 Generating CTCSS #1 or #2:

Using a master oscillator with Option 1204-14 installed to provide up to two different CTCSS tones to one or more radios (18 kHz and CTCSS tone can be daisy-chained to multiple Model 1118's).

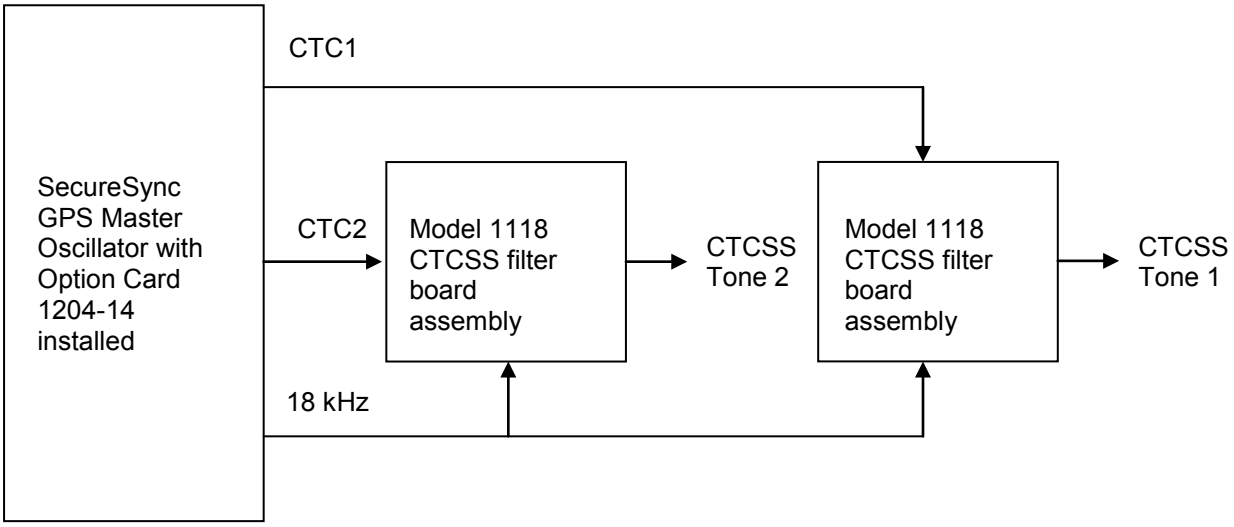

Figure 3-2: Signal flow to feed different synchronized CTCSS tones to two different transmitters

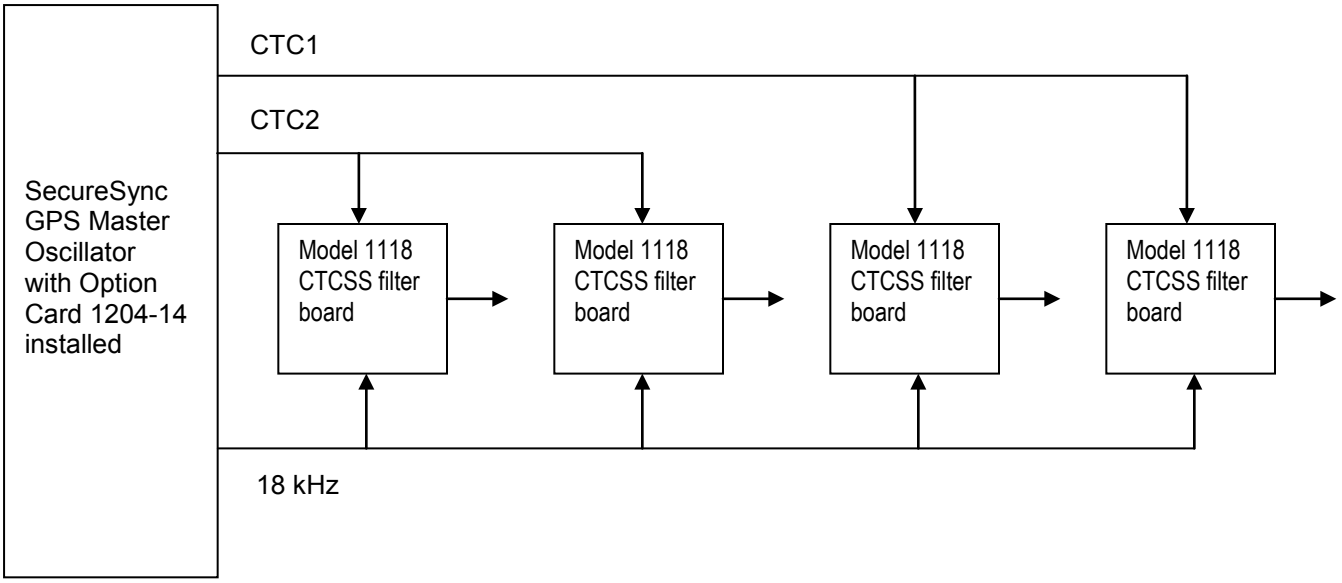

Figure 3-3: Signal flow for multiple uses of two CTCSS tones

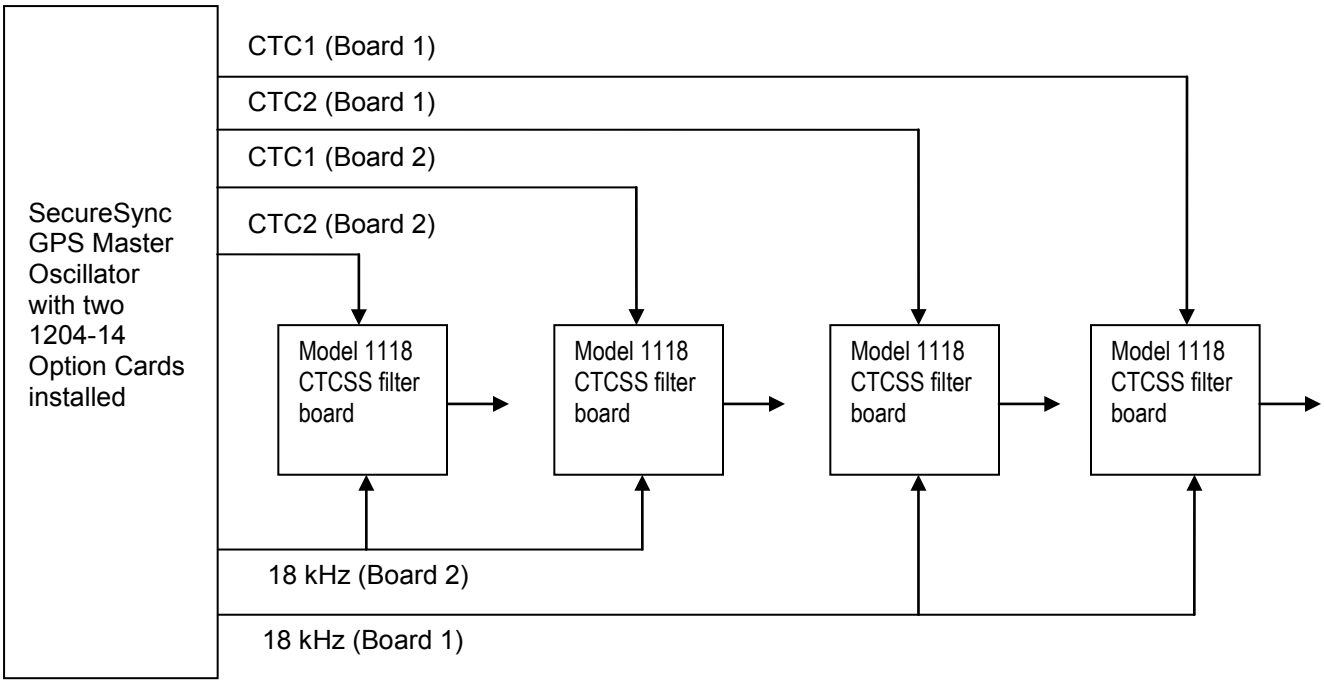
CTC1 (Board 1)
CTC2 (Board 1)
CTC1 (Board 2)
CTC2 (Board 2)
SecureSync GPS Master Oscillator with two 1204-14 Option Cards installed
Model 1118 CTCSS filter board
Model 1118 CTCSS filter board
Model 1118 CTCSS filter board
Model 1118 CTCSS filter board
18 kHz (Board 2)
18 kHz (Board 1)

Figure 3-4: Signal flow for four different CTCSS outputs

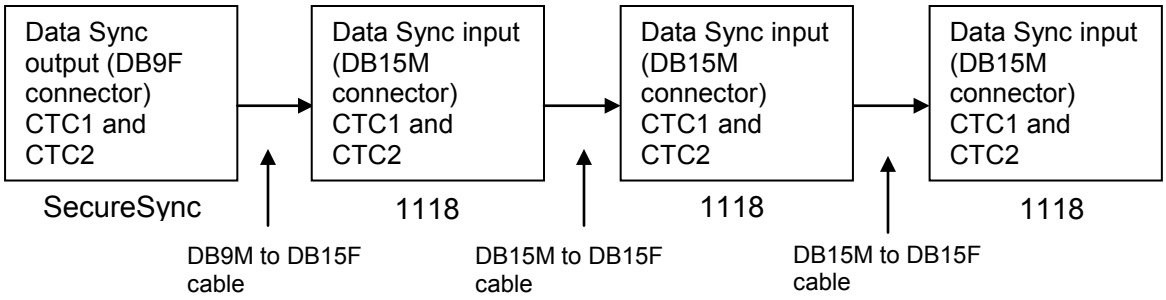
Data Sync output (DB9F connector) CTC1 and CTC2
Data Sync input (DB15M connector) CTC1 and CTC2
Data Sync input (DB15M connector) CTC1 and CTC2
Data Sync input (DB15M connector) CTC1 and CTC2
SecureSync
1118
1118
1118
DB9M to DB15F cable
DB15M to DB15F cable
DB15M to DB15F cable

Figure 3-5: Cable connections for multiple Model 1118 boards

For more tones, add additional 1204-14 Option Cards in SecureSync and repeat above.

After the first DB-9M to DB-15F cable, you can connect a 1 to 1 DB15M-F cable from the DB15F J2 “Data Sync Loop Thru” connector of the first unit to J1 DB15M “Data Sync” connector on the second unit. Repeat this step for each additional unit.

Connect J4 (Power & I/O) as described above.

Unterminate both the 18 kHz and CTCSS inputs if they are not the last Model 1118 located in the chain. Terminations should be left in the last Model 1118 in the chain.

3.1.2 Details: Output Connections J4 or J6

- Connect CTCSS out on J4 pin 6 [or J6 pin 1] to base station CTCSS input. The amplitude is set at the factory to 0.5 volts rms.

- Connect Delayed PTT out on J4 Pin 9 [or J6 pin 6) to base station PTT input. The held is set at the factory to 150 msec.

- The Model 1118 contains headers that allow for user configuration as required. These jumpers determine the frequency cutoff (whether the CTCSS tone is above or below 150Hz), whether the tone is CTCSS #1 or CTCSS #2, the ability to terminate the two CTCSS tones and 18kHz when the Model 1118 board is the last one in the daisy-chain.

3.1.3 Jumper Settings – List in Numerical Sequence

The Model 1118 contains headers that allow for user configuration as required. These jumpers determine the frequency cutoff (whether the CTCSS tone is above or below 150Hz), whether the tone is CTCSS #1 or CTCSS #2, the ability to terminate the two CTCSS tones and 18kHz when the Model 1118 board is the last one in the daisy-chain.

List of jumper settings:

H1	Determines the cut-off frequency of the filter. Position A is for CTCSS tone frequencies greater than 150 Hz, position B is for frequencies less than 150 Hz. The default position is B.
H2	Determines the Inhibit input polarity. In position A the tone is inhibited when the input is open, in position B the tone is inhibited when the input is grounded. The default position is B.
H3	Determines the PTT input polarity. In position A the CTCSS tone and PTT output are enabled when the input is grounded, in position B the outputs are enabled when the input is open or pulled high. The default position is A.
H4	Grounds one side of the CTCSS tone output. When the jumper is on, the CTCSS low output is grounded. The default position is on.
H5	Grounds one side of the PTT output. When the jumper is on, the PTT output low side is grounded. The default position is on.
H6, H7	Selects CTCSS frequency #1 input from the master oscillator. The default position for both jumpers is on.
H8, **H9**	Selects CTCSS frequency #2 input from the master oscillator. The default position for both jumpers is off.
H10, **H11**	Unused. The default position for both jumpers is off.
H12, **H13**	Unused. The default position for both jumpers is off.
H14	Terminates the CTCSS frequency #1 input into 120 ohms. The default position is on.
H15	Terminates the CTCSS frequency #2 input into 120 ohms. The default position is

	on.
H16	Unused. The default position is on.
H17	Unused. The default position is on.
H18	Unused. The default position is on.
H19	Terminates the 18 kHz clock input from J1 into 120 ohms. The default position is on.
H20	Enables the legacy mode of operation or reverse burst. When this jumper is on the 180 degree inverted tone output during the delayed portion of the PTT output is disabled. The default position is off.
H21, **H22**	Unused. The default position for both jumpers is off.
H23, **H24**	These jumpers select the 18 kHz applied on J1 (DB15 data sync) as the filter clock source. Default position is on.

3.1.4 Input Connections J4 (1118-2)

- Connect PTT into J4 pin 5 from PTT line
- Connect positive polarity voltage (power) to J4 pin 3
- Connect ground to J4 pin 1
- Connect a cable from the SecureSync DB-9 “Data Sync” connector to the “Data Sync” DB-15 connector on the Model 1118 CTCSS generator filter board
- Unterminate the 18 kHz and CTCSS inputs if this is not the last Model 1118 in the chain.
- Refer to Section 3.2 for specific installation instructions

3.1.5 Input Connections J6 (1118-1 Only)

- Connect PTT into J6 pin 5 from PTT line
- Connect positive polarity voltage (power) to J6 pin 4
- Connect ground to J6 pin 3
- Connect a cable from SecureSync DB-9 “Data Sync” connector to the DB-15 “Data Sync” connector on the CTCSS generator filter board.
- Unterminate the 18kHz and CTCSS inputs if this is not the last Model 1118 in the chain.
- Refer to Section 3.2 for specific installation instructions.

3.2 Detailed Installation Instructions

3.2.1 CTCSS Inputs

There are 2 possible CTCSS inputs, labeled CTCSS #1 and CTCSS #2. The different CTCSS frequencies set on the SecureSync GPS Master Oscillator drive the CTCSS filter board assembly. They are input to the CTCSS filter assembly on connector J1. J2 is a loop thru connector for connecting more CTCSS filter boards to the same SecureSync output. If the loop thru connector is used, the termination should be set on the last CTCSS filter board in the string. The CTCSS inputs are individually selected and terminated with jumpers. Either jumper pairs H6 and H7 for CTCSS #1 or H8 and H9 for CTCSS #2 select one of the CTCSS inputs.

CTCSS signal inputs from the master oscillator are a differential signal (RS-485) that should be terminated into 120 ohms when the Model 1118 is either the only one connected to the master oscillator or is the last one in a daisy-chain of Model 1118s all connected to the master oscillator. One jumper can individually terminate each CTCSS input: jumper H14 for CTCSS #1, jumper H15 for CTCSS #2.

The CTCSS input signal is a square wave that is operating at the specified CTCSS frequency. The differential signal is converted to a single ended signal then converted into a sine wave, filtered and amplitude controlled before it is output as the CTCSS tone output.

The 18 kHz Clock input on “Data Sync” connector J1 pins 3 and 4 from the master oscillator is a differential signal (RS-485) that should be terminated into 120 ohms by jumper H19 when the Model 1118 is either the only one connected to the master oscillator or is the last one in a daisy-chain of Model 1118s off the master oscillator.

Headers to configure Model 1118 for DB-15 tone1 input (CTC1)		
Header	Function	Installed?
H6 and **H7**	CTC1 input	Install
H14	CTC1 input termination	Install only if this is the only board connected to the master oscillator or is the last board in the daisy-chain of multiple boards. Otherwise, remove this header.
H8, **H9**	Headers for CTC 2 selection	Remove these headers

Headers to configure Model 1118 for DB-15 tone2 input (CTC2)		
Header	Function	Installed?
H8 and **H9**	CTC2 input	Install
15	CTC2 tone input termination	Install only if this is the only board connected to the master oscillator or is the last board in the daisy-chain of multiple boards. Otherwise, remove this header
H6, **H7**	Headers for CTC1 selection	Remove these headers

3.2.1.1 CTCSS Output

J4 Pin 6 [or J2 pin 1] is the CTCSS tone output. This output provides a sine wave at the configured CTCSS frequency. The output structure is a capacitor-coupled transformer. For a balanced output, J4 Pin 7 [or J3 pin 1] is the second connection. Remove the H4 jumper when operating in this mode. The output amplitude is adjustable using potentiometer R14. The adjustment range is 0 to 4.0 volts peak-peak, 0 to 1.4 Vrms. The output amplitude is factory set to 1.4 volts peak-to-peak, 0.5 Vrms. This adjustment can be made for the appropriate Deviation setting if required. Refer to Section 2.1.1.

Jumper H1's position should be set based upon the output frequency. Place H1 in position B if the CTCSS tone frequency is <150Hz (factory default) or in position A if the CTCSS tone frequency is > 150Hz.

Headers to configure CTCSS filter for the desired CTCSS tone		
Header	Function	Installed?
H1	Determines the cut-off frequency of the CTCSS filter	Install in Position A If selected CTCSS frequency Is greater than 150Hz. Install in Position B If selected CTCSS frequency Is less than 150Hz.

Headers to configure CTCSS as balanced or single-ended		
Header	Function	Installed?
H4	Ground one side of the CTCSS tone output **transformer**.	Install to ground the low side of the CTCSS tone output.

3.2.1.2 PTT Input

The PTT input on J4 Pin 5 [or J6 pin 5] is used to activate the Delayed PTT output. The input is comprised of an optical isolator that reacts to the flow of current. H3 is used to establish the polarity of the input signal. If H3 is in the A position, the Delayed PTT output will activate when

there is current flowing at the input. In position B, the output will activate when there is no current flowing. If H3 is not installed, the Delayed PTT output will be active. Input current can be established with either a switch contact to circuit ground or with a voltage. Current will begin to flow when the input voltage is less than 4.5 volts. Voltages above 4.5 volts will cause the current to cease.

Header to configure Model 1118 for PTT (Push to Talk) input (from Multiplexer)		
Header	Function	Installed?
H3	PTT Input polarity	In Position A, the CTC tone and PTT are enabled when the input is grounded. In Position B, the outputs are enabled when the input is open or pulled high.

3.2.1.3 PTT Output

J4 Pin 9 [or J2 pin 6] is the PTT output. CTCSS tones are gated by PTT; the PTT input active immediately causes the PTT Output to go active. PTT inactive will cause the PTT output to go inactive after the PTT delay. The delay is factory set to 150 milliseconds.

This output is a solid-state switch. When PTT is active, the switch will turn on. When PTT is inactive, the switch will turn off. The turn-on resistance of this output is approximately 20 ohms. Jumper H5 is used in conjunction with this output to reference one end of the switch to circuit ground. For a balanced output, J4 pin 10 [or J3 pin 2] is the second connection. Remove jumper H5 when operating in balanced output mode.

Header to configure Model 1118 PTT (Push to Talk) output (To Transmitter)		
Header	Function	Installed?
H5	Ground one side of the PTT tone output.	Install to ground the low side of the PTT output.

3.2.1.4 CTCSS Inhibit Input

The Inhibit input on J4 Pin 11 [or J5 pin 3] is used to de-activate the CTCSS tone output. The Inhibit input is comprised of an optical isolator that reacts to the flow of current. H2 is used to establish the polarity of the input signal. If H2 is in the A position, the CTCSS tone output will de-activate when there is no current flowing at the input. In position B, the output will de-activate when there is current flowing. When H2 jumper is not installed, the CTCSS tone output will be enabled. Input current can be established with either a switch contact to circuit ground or with a voltage. Current will begin to flow when the input voltage is less than 4.5 volts. Voltages above 4.5 volts will cause the current to cease.

Header to configure Model 1118 for Inhibit input (from Multiplexer)		
Header	Function	Installed?
H2	Inhibit Input polarity	In Position A, the CTC tone is inhibited when the input is grounded. In Position B, the outputs are enabled when the input is open or pulled high.

3.2.2 18 kHz Reference Input

Headers to configure the 18kHz input for J1 (DB-15) input		
Header	Function	Installed?
H23 and **H24**	18kHz input for **J1** input (Data Sync connector)	Install if 18kHz is connected to **J1** (Data Sync connector)
H19	18kHz input termination for **J1** (Data Sync connector)	Install if 18kHz is connected to **J1** and this is either the only board or the last board in the daisy-chain. (Data Sync connector). Otherwise, remove this header.

3.2.3 Power Input

Power input is provided on **J4** Pins 3 and 2 [or **J6** pins 4 and 3]. **J4** Pin 3 [or **J6** pin 4] is the positive supply voltage and **J4** pin 2 [or **J6** pin 3] is the circuit ground. The required range of voltage is 7 to 20 volts. Approximately 30ma of current is required.

4 Schematics

4.1 Product Schematic

The product schematic is included as Figure 4-1.

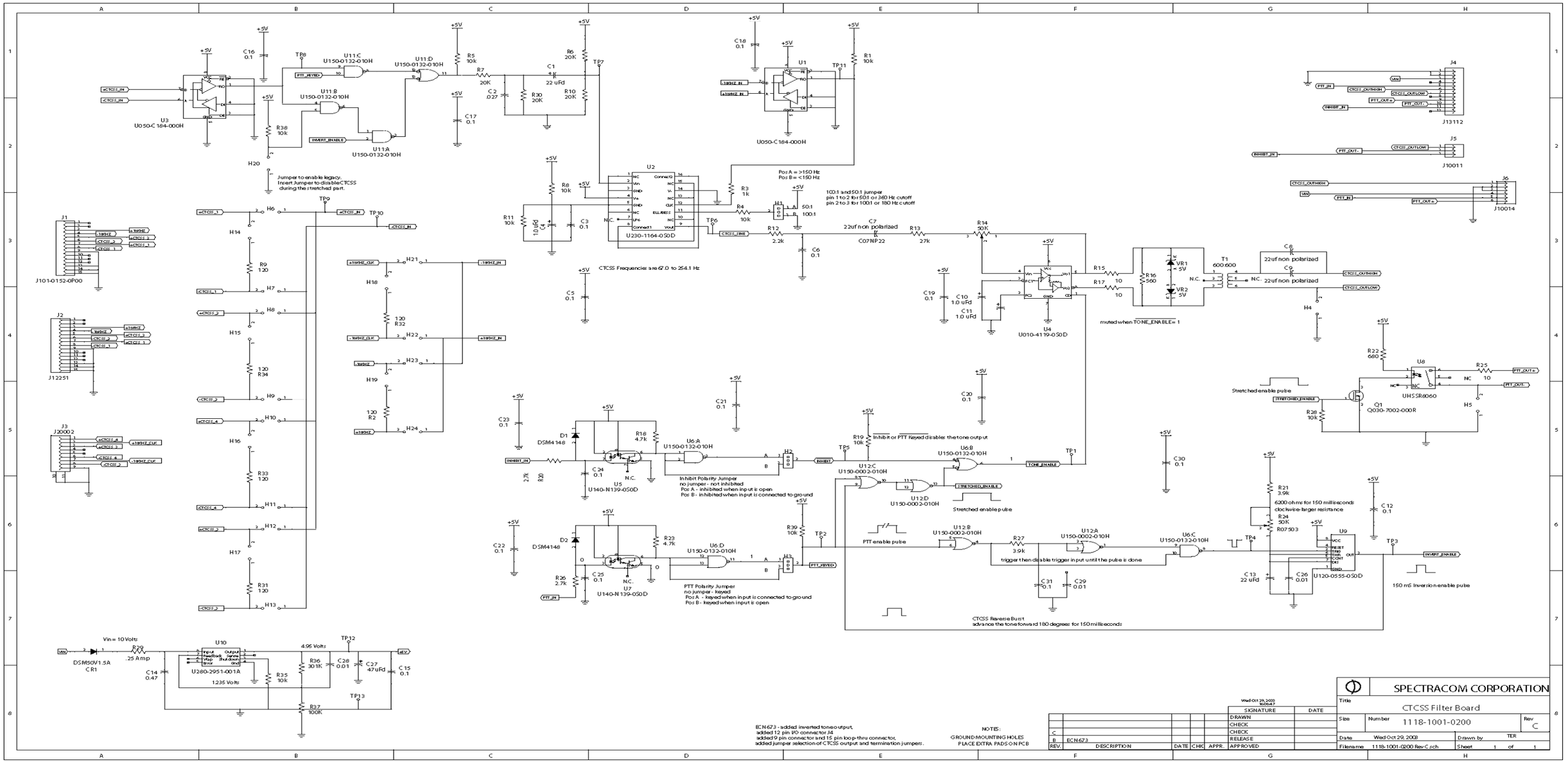

FIGURE 4-1: Schematic

Document Revision History			
Rev	***ECN***	***Description***	***Date***
C	2327	*Additional data added to various tables; model no. specifications. Part number changed from MANCTCSS to 1118-5000-0050. Added Figures 2-1 and 2-2, illustrating pin-outs for J4, J5, J6 connectors. Added weight and dimension figures for both -1 and -2 variants. Provided new version of schematic drawing.*	n/a
D	2369	*Moved location drawing to Section 2 and replaced it with simplified depiction of headers and connectors. Corrected a reversal of header references to H10/11 and H12/13 as well as for H16 and H17.*	n/a
E	2559	*Updates to coincide with added support for SecureSync.*	February 2011
F	2693	*Updated Table 1-2: DB-15 Input Pin Assignments. Additional minor maintenance.*	June 2011

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